Claims

1. A catalyst-coated ion-conducting membrane for electrochemical devices, which comprises a membrane having front and reverse sides (1), at least one catalyst layer (3) and a sealing material (4), wherein the sealing material (4) is applied in the edge region of the ion-conducting membrane (1).

2. The catalyst-coated ion-conducting membrane as claimed in claim 1, wherein the thickness of the sealing material (4) (d_D) corresponds to at least the thickness of the catalyst-coated ion-conducting membrane (d_{CCM}).

3. The catalyst-coated ion-conducting membrane as claimed in claim 1, wherein the sealing material (4) contacts the ion-conducting membrane (1) circumferentially in an edge region of at least 1 mm on one side.

4. The catalyst-coated ion-conducting membrane as claimed in any of claims 1 to 3, wherein the at least one catalyst layer comprises precious metal based catalysts and is applied over the entire area of the ion-conducting membrane.

5. The catalyst-coated ion-conducting membrane as claimed in any of claims 1 to 4, which comprises both a catalyst layer on the front side (2) and a catalyst layer on the reverse side (3) of the ion-conducting membrane.

6. The catalyst-coated ion-conducting membrane as claimed in any of claims 1 to 5, wherein the sealing material comprises thermoplastic polymers and/or copolymers from the group consisting of

polyethylenes, polypropylenes, polytetrafluoroetylenes, PVDF, polyesters, polyamides, polyamide elastomers, polyimides and polyurethanes, elastoers from the group consisting of silicones, silicone elastomers, EPDM, fluorinated elastomers, perfluorinated elastomers, chloroprene elastomers, fluorosilicone elastomers and/or thermoset polymers from the group consisting of epoxy resins, phenolic resins and cyano-crylates.

7. The catalyst-coated ion-conducting membrane as claimed in any of claims 1 to 6, wherein the ion-conducting membrane comprises organic polymers such as proton-conducting perfluorinated polymeric sulfonic acid compounds, doped polybenzimidazoles, polyether ketones, polysulfones and/or ion-conducting ceramic materials.

8. A membrane-electrode assembly for electrochemical devices, which comprises an ion-conducting membrane having front and reverse sides (1), a first catalyst layer on the front side (2), a second catalyst layer on the reverse side (3), a first gas diffusion layer (5) on the front side, a second gas diffusion layer on the reverse side (6) and a sealing material (4), wherein the sealing material (4) contacts the insides of each of the gas diffusion layers (5) and (6) in the edge region.

9. The membrane-electrode assembly as claimed in claim 8, wherein the sealing material contacts the insides of the gas diffusion layers (5) and (6) circumferentially in the edge region to a width of at least 1 mm.

10. The membrane-electrode assembly as claimed in claim 8 or 9, wherein the gas diffusion layers (5)

and (6) comprise porous, electrically conductive materials such as woven carbon fiber fabrics, carbon fiber felts or carbon fiber papers.

11. A process for producing a catalyst-coated ion-conducting membrane having an integrated sealing material, which comprises

- providing an ion-conducting membrane (1) having at least one catalyst layer applied over the entire area and

- applying the sealing material (4) in the edge region of the ion-conducting membrane (1) on one side with the aid of elevated pressure and/or elevated temperature.

12. A process for producing a membrane-electrode assembly having an integrated sealing material, which comprises

- providing a catalyst-coated ion-conducting membrane with sealing material as claimed in any of claims 1 to 7, and

- applying the gas diffusion layers (5) and (6) to front and reverse sides of the catalyst-coated ion-conducting membrane with the aid of elevated pressure and/or elevated temperature.

13. A process for producing a membrane-electrode assembly having an integrated sealing material, which comprises

- providing an ion-conducting membrane (1) having at least one catalyst layer applied to the entire area,

- positioning the sealing material (4) on one side in the edge region of the ion-conducting membrane (1),

- positioning the gas diffusion layers (5) and (6) on front and reverse sides of the catalyst-coated ion-conducting membrane,

- bonding the structure at elevated pressure and/or temperature.

14. The process as claimed in claim 11, wherein the pressure (quoted as area pressure based on the frame area of the sealing material) is in the range from 50 to 300 N/cm^2 and the temperature range is from 20 to 200 °C.

15. The process as claimed in claim 12 or 13, wherein the pressure (quoted as area pressure based on the area of the gas diffusion layer) is in the range from 50 to 200 N/cm^2 and the temperature range is from 20 to 200 °C.

16. Use of the catalyst-coated ion-conducting membranes as claimed in any of claims 1 to 7 for producing membrane-electrode assemblies for electrochemical devices, in particular for fuel cells.

17. Use of the membrane-electrode assemblies as claimed in any of claims 8 to 10 for electrochemical devices, in particular for fuel cells.